

Claims

- [c1] What is claimed is:
- 1.(Amended) A thermal module for dissipating heat in a laptop computer, the thermal module comprising:
 - a heat pipe for rapidly transferring heat;
 - a heat absorber disposed at one end of the heat pipe for absorbing heat;
 - $\{ \}$
a heat storage disposed at another end of the heat pipe for storing excess heat;
 and
 - a heat dissipater disposed at one section of the heat pipe between the heat absorber and the heat storage.
 - [c2] 2. The thermal module of claim 1 wherein the heat storage is fixed flush against all surfaces contacting the heat pipe.
 - [c3] 3. The thermal module of claim 1 wherein the heat storage is fixed flush against all surfaces contacting the heat dissipation region.
 - [c4] 4. The thermal module of claim 1 wherein the heat storage comprises a casing.
 - [c5] 5. The thermal module of claim 4 wherein the casing is flexible.
 - [c6] 6. The thermal module of claim 4 wherein the casing comprises an electrically insulating layer.
 - [c7] 7. The thermal module of claim 4 wherein the casing comprises a thermally insulating layer.
 - [c8] 8. The thermal module of claim 4 further comprising a first phase change material disposed within the casing, the first phase change material storing excess heat during a period of high heat absorption and releasing the stored heat during a period of lower heat absorption.
 - [c9] 9. The thermal module of claim 8 wherein the first phase change material is selected from the group consisting of wax, water, neopentyl glycol (NPG), and $\text{Na}_2\text{S}_2\text{O}_3 + 5\text{H}_2\text{O}$.
 - [c10] 10. The thermal module of claim 8 wherein the first phase change material

changes from a solid state to a liquid state at a first predetermined temperature.

- [c11] 11. The thermal module of claim 10 further comprising a second phase change material disposed within the heat pipe.
- [c12] 12. The thermal module of claim 11 wherein the second phase change material changes from a liquid state to a gaseous state at a second predetermined temperature.
- [c13] 13. The thermal module of claim 12 wherein the first predetermined temperature is higher than the second predetermined temperature.
- [c14] 14. A thermal module for dissipating heat in a laptop computer, the thermal module comprising:
- a heat generating electrical component;
 - a heat sink capable of dissipating a predefined reasonable thermal target quantity of heat corresponding to a predefined temperature;
 - a heat pipe for transferring heat from the electrical component to the heat sink, one end of the heat pipe being in thermal contact with the heat generating electrical component, a section of the heat pipe being in thermal contact with the heat sink; and
 - a heat storage device disposed at another end of the heat pipe so that the heat sink is between the heat storage device and the heat generating electrical component, the heat storage device comprising a casing and a first phase change material confined within the casing, the first phase change material changing from one physical state to another physical state at approximately the predefined temperature, the heat storage device disposed in flush thermal contact with the heat pipe such that when the heat pipe transfers a quantity of heat from the heat generating electrical component to the heat sink in excess of the reasonable thermal target, the heat storage device absorbs and stores the excess heat.